Comparison of *x*-distributions between Sartre cf. Goncalves et. al. and Leading Twist Shadowing

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Differences between the models:

Goncalves et. al. uses CGC (w. different params.):

$$\mathcal{N}(x,\boldsymbol{r}) = \begin{cases} \mathcal{N}_0 \left(\frac{\boldsymbol{r}\,Q_s}{2}\right)^{2\left(\gamma_s + \frac{\ln(2/\boldsymbol{r}\,Q_s)}{\kappa\,\lambda\,Y}\right)}, & \text{for } \boldsymbol{r}Q_s(x) \le 2 \\ 1 - \exp^{-a\,\ln^2(b\,\boldsymbol{r}\,Q_s)}, & \text{for } \boldsymbol{r}Q_s(x) > 2 \end{cases}$$

Linear part

Saturation

$$Q_s^2 = Q_0^2 \left(\frac{x_0}{x}\right)^{\lambda}$$

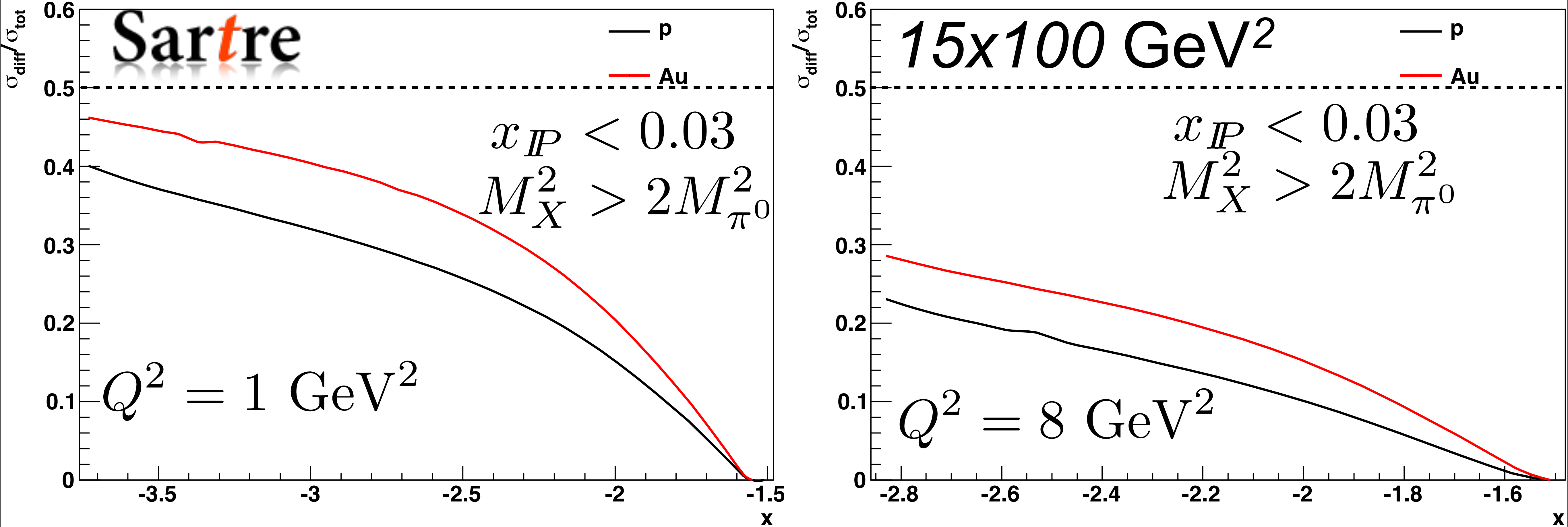
A-dependence: $Q_{s,A}^2 = A^{\frac{1}{3}} \times Q_s^2(x)$

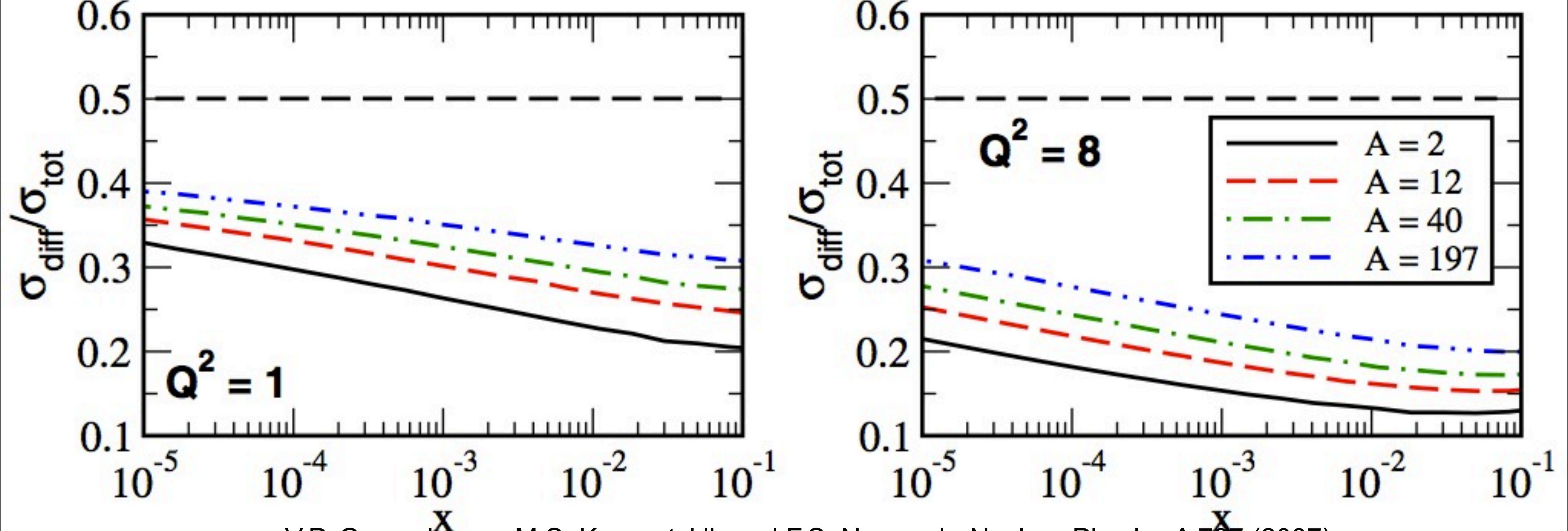
Sar*t*re, bSat:

$$\mathcal{N}^{(p)}(x,r,b) = 1 - e^{-\frac{\pi^2}{2N_C} r^2 \alpha_S(\mu^2) x g(x,\mu^2) T(b)}$$

A-dependence: $\mathcal{N}^{(A)} = 1 - \left(1 - T_A(\mathbf{b}) \int \mathcal{N}^{(p)} \mathrm{d}b\right)^A$

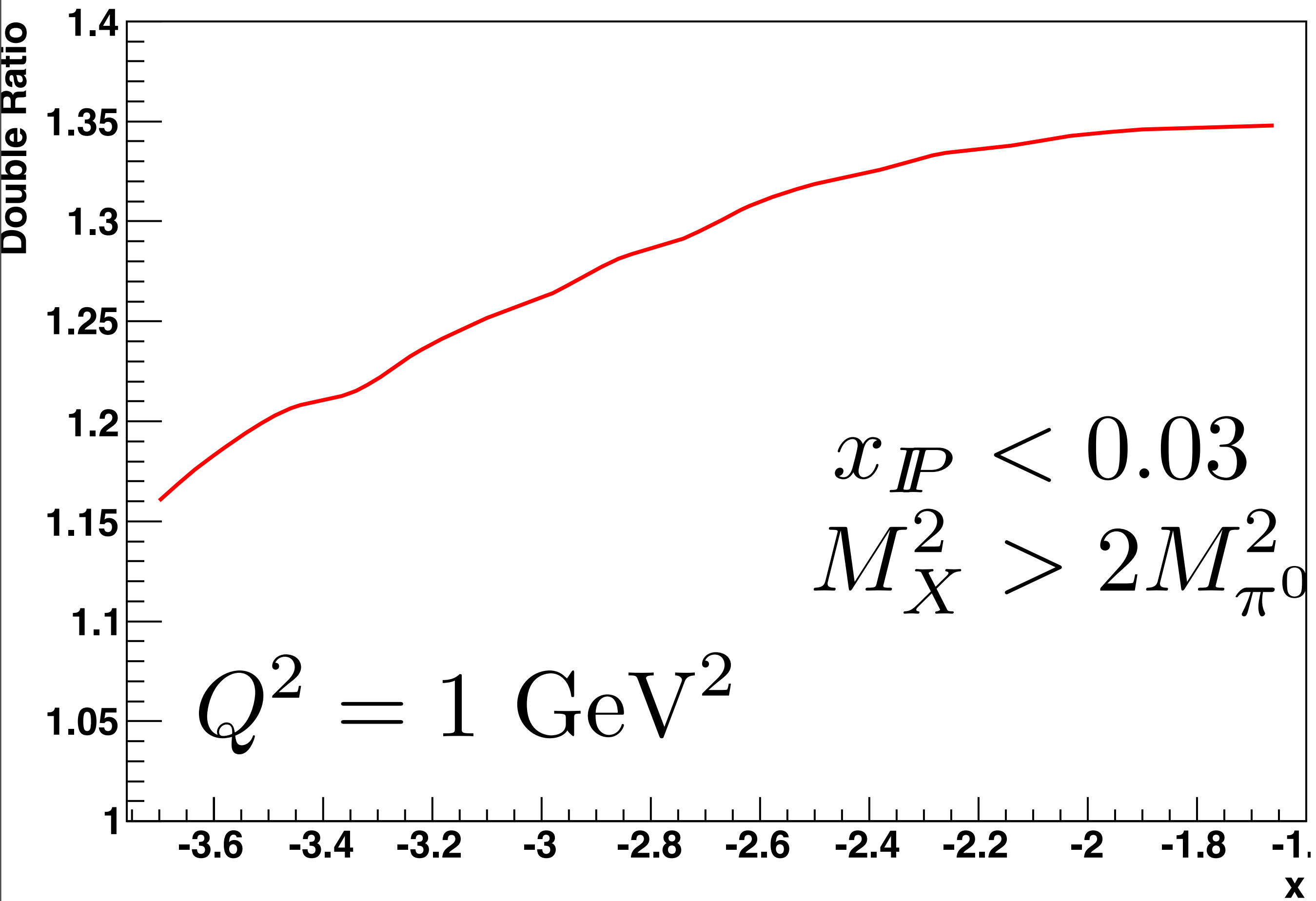
Woods-Saxon

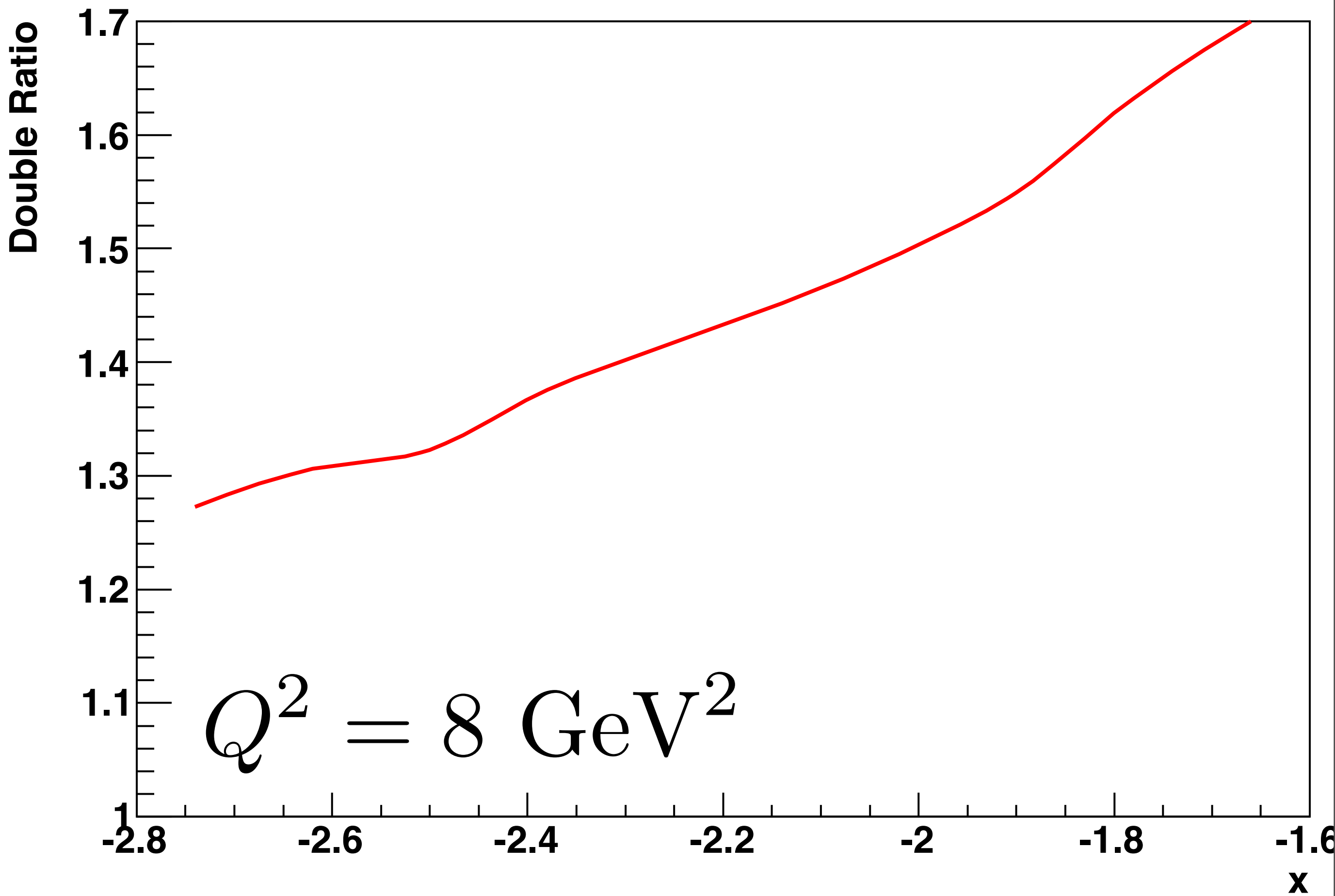




V.P. Gon ̧calves a, M.S. Kugeratskib and F.S. Navarrab, Nuclear Physics A 787 (2007) 415c–422c

Double Ratios





Vadim's Note

Three limits, in simple Glauber model:

1. Black Disk Limit (BDL) for *ep* and *eA*

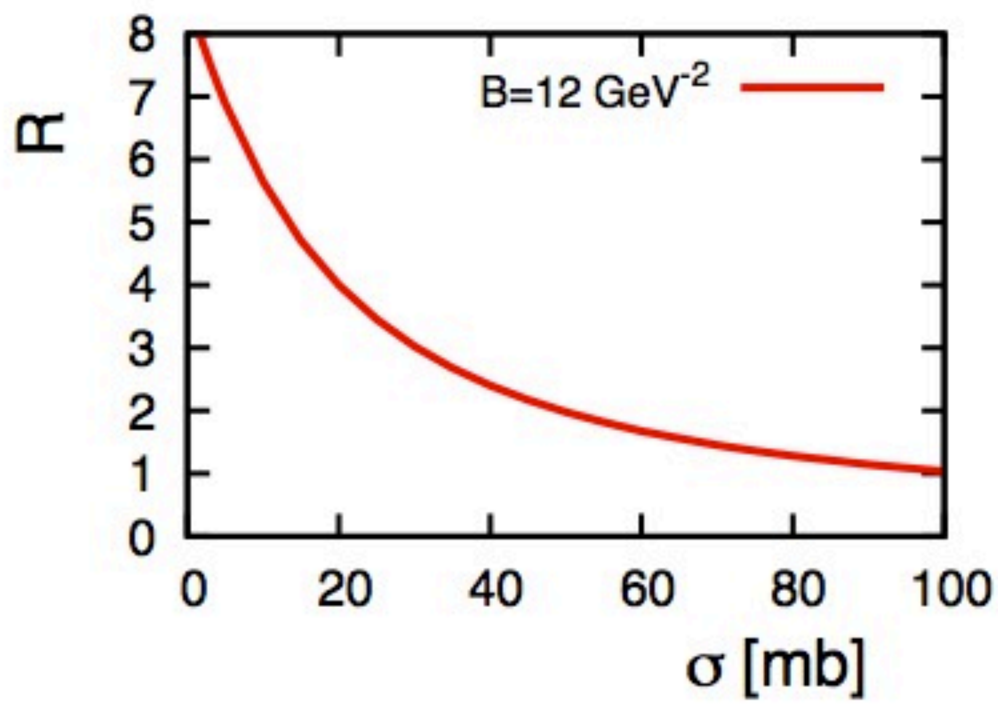
$$\frac{\sigma_{diff}}{\sigma_{tot}} = \frac{1}{2} \Rightarrow R = 1$$

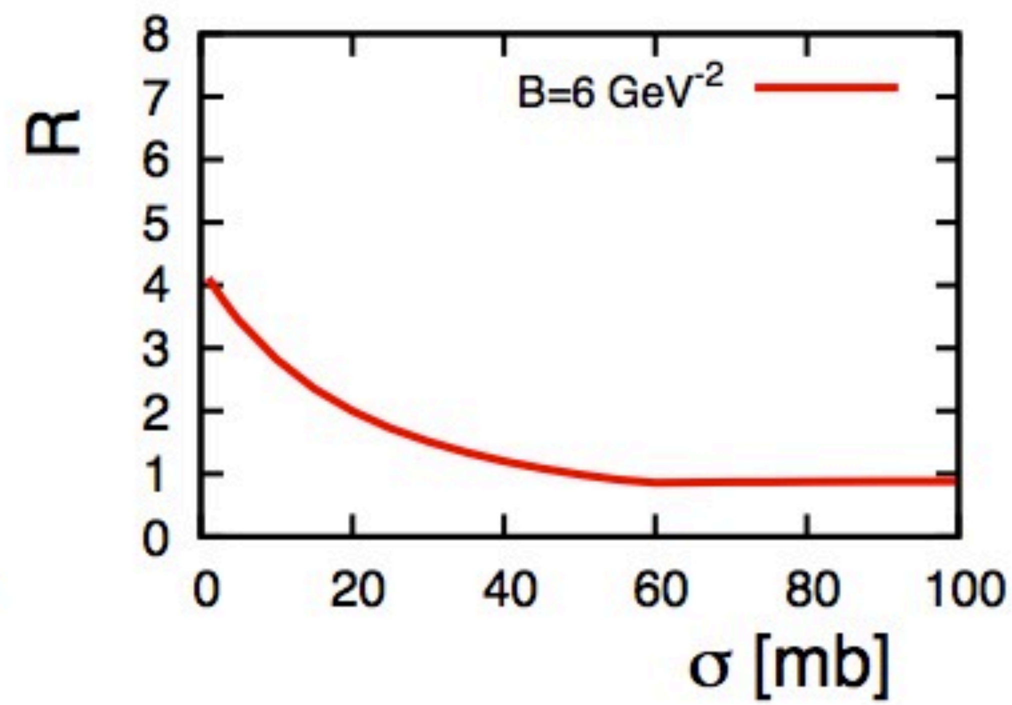
2. BDL is reach for *eA* only

$$R > 1$$

3. The colour transparency limit (far from BDL)

$$R \to \frac{4BA^{1/3}}{(1.15\ \mathrm{fm})^2} \approx 8.6$$





Leading Twist Shadowing Model

$$R = \frac{\int d^2b \left(1 - e^{-\sigma_{\rm soft}/2T(b)}\right)^2}{2\int d^2b \left(1 - e^{-\sigma_{\rm soft}/2T(b)}\right) + A\sigma_{\rm soft}(\sigma_{\rm soft}/\sigma_2 - 1)} \frac{\sigma_2}{\sigma_{2,el}}$$

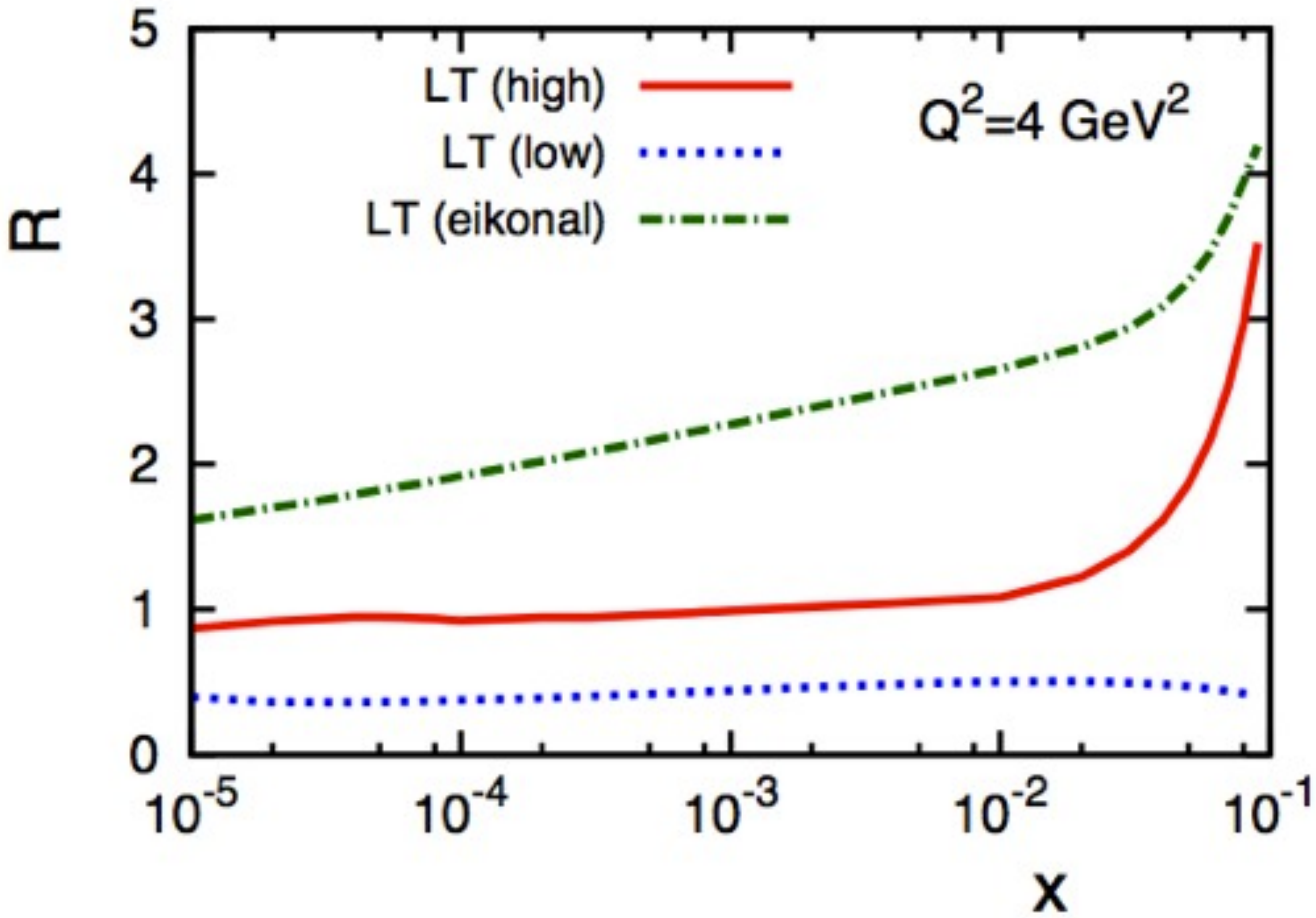
Model dependent soft cs: σ_{soft}, 3 scenarios

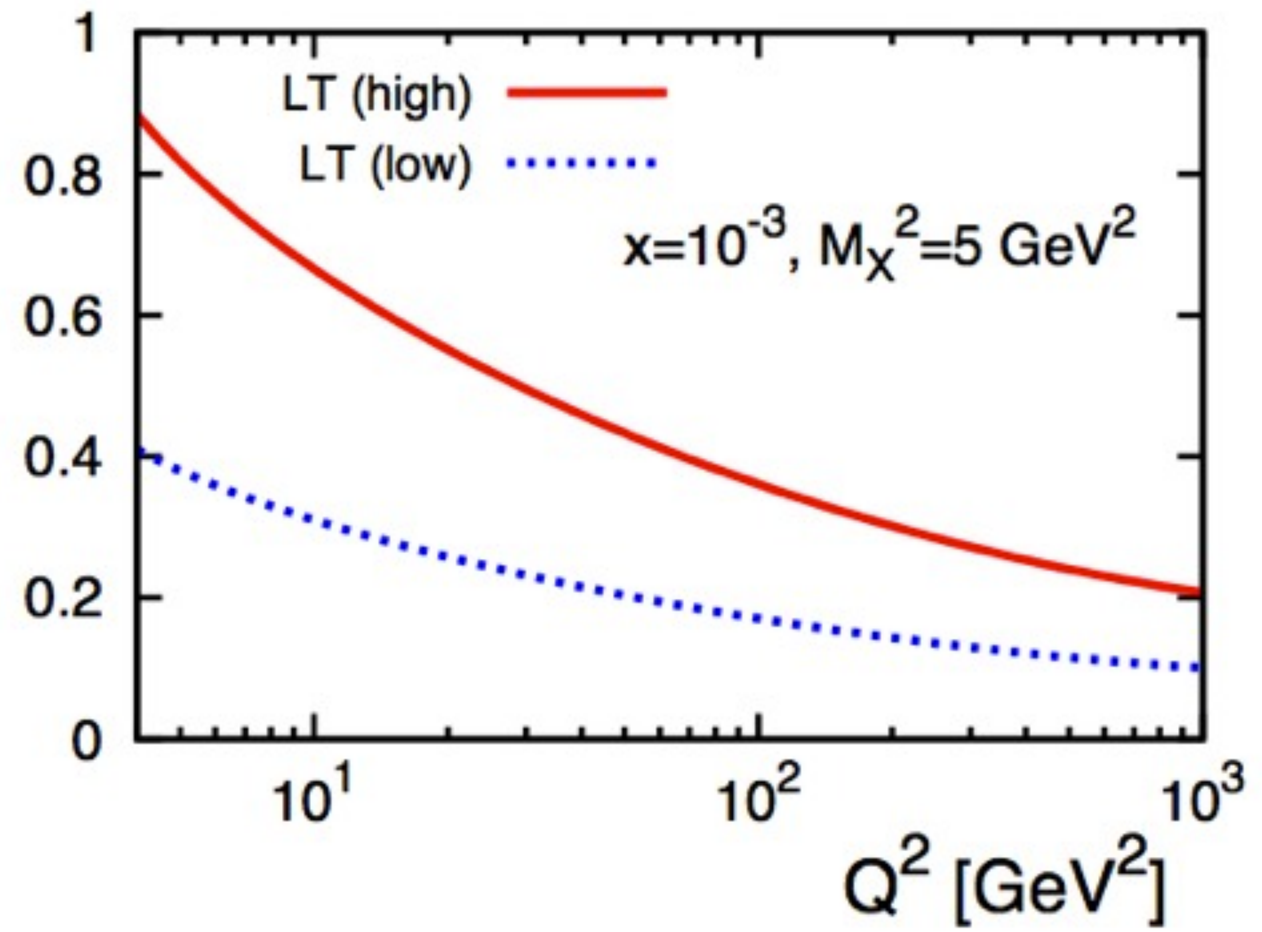
If $\sigma_{soft} = \sigma_2$, *R*(LTM) =*R*(GBW), *Eikonal scenario*

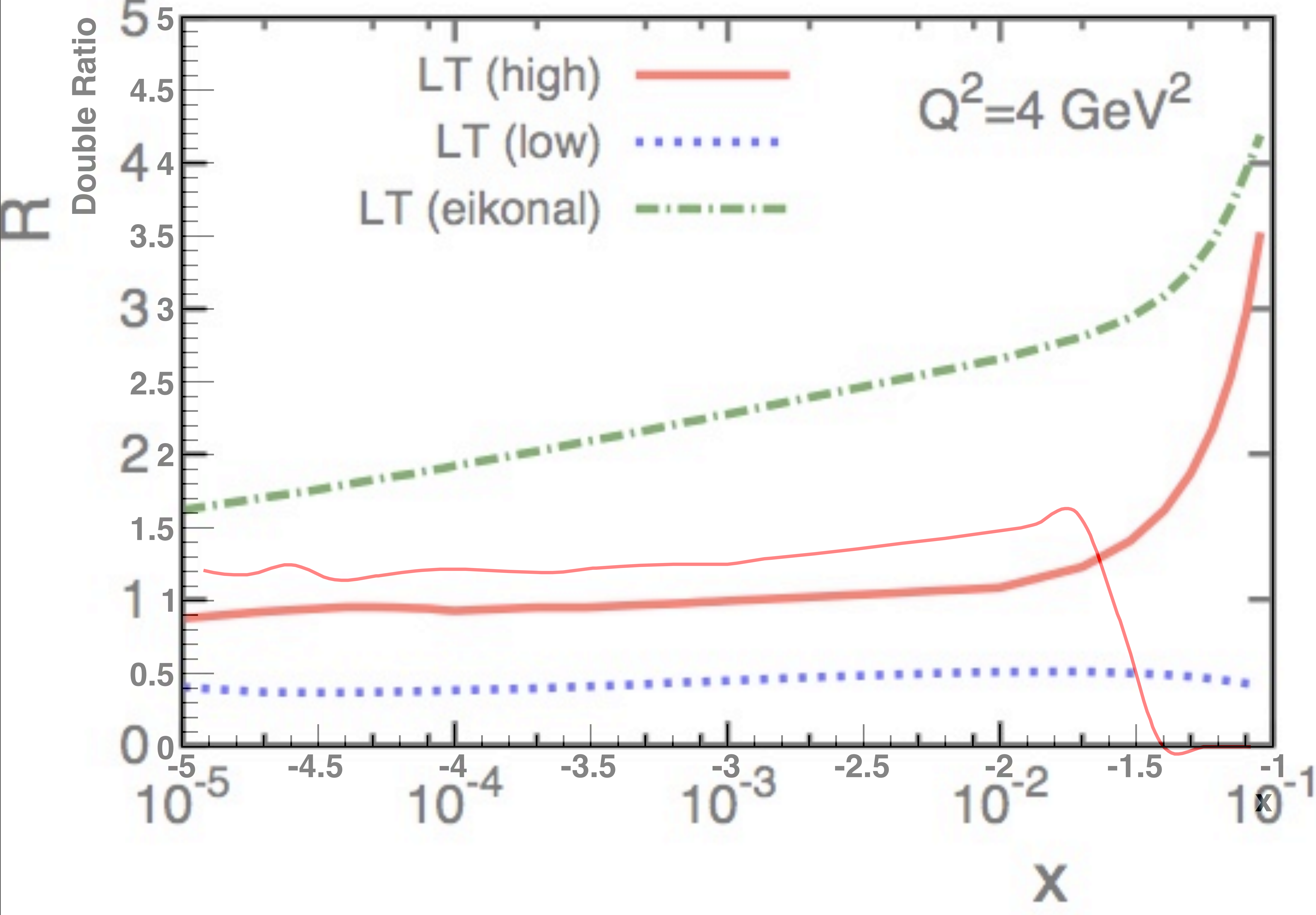
LTS: $\sigma_{soft} > \sigma_2$

"*LT (high)*" corresponds to high shadowing scenario

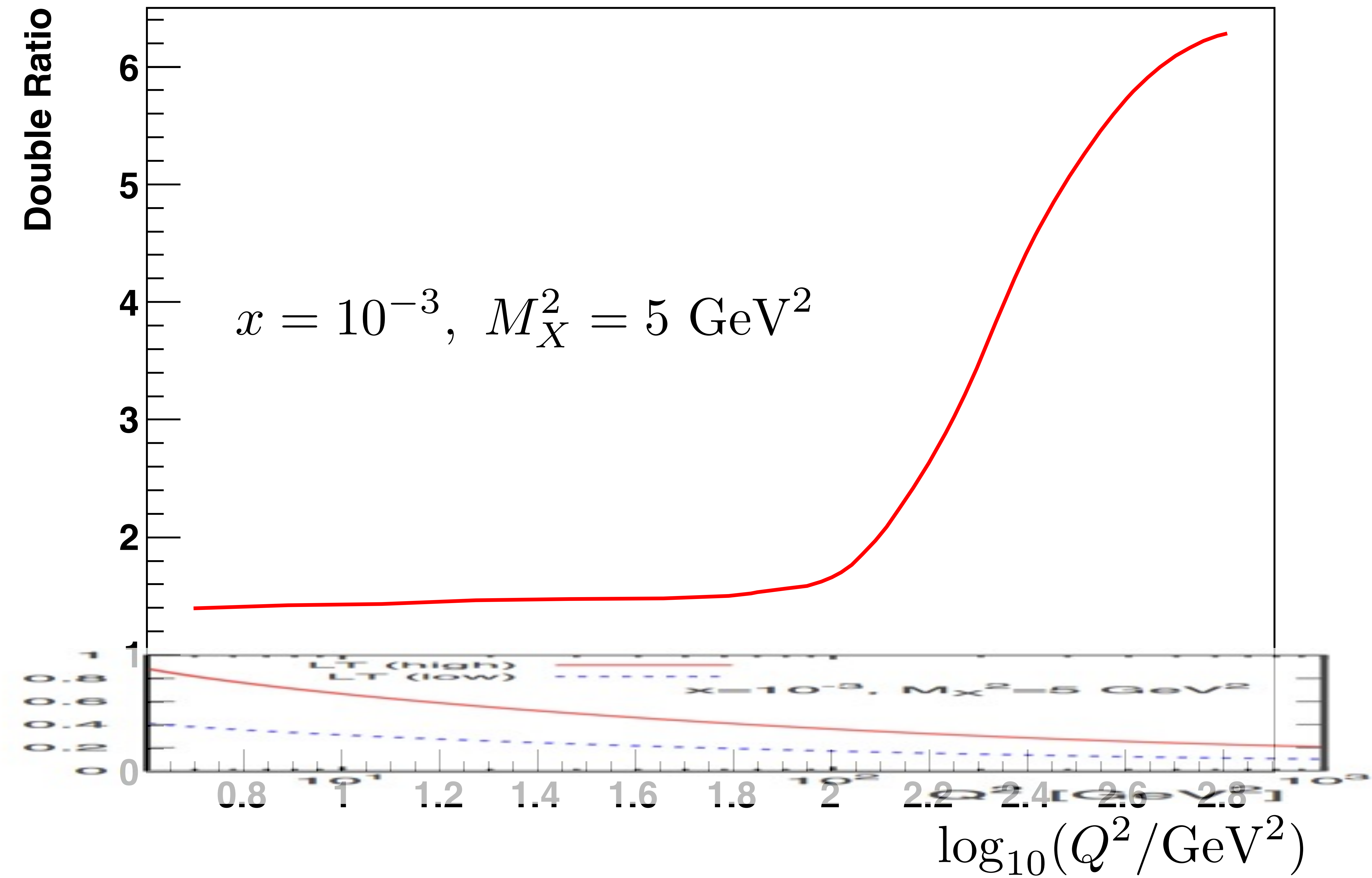
"*LT (low)*" corresponds to low shadowing scenario

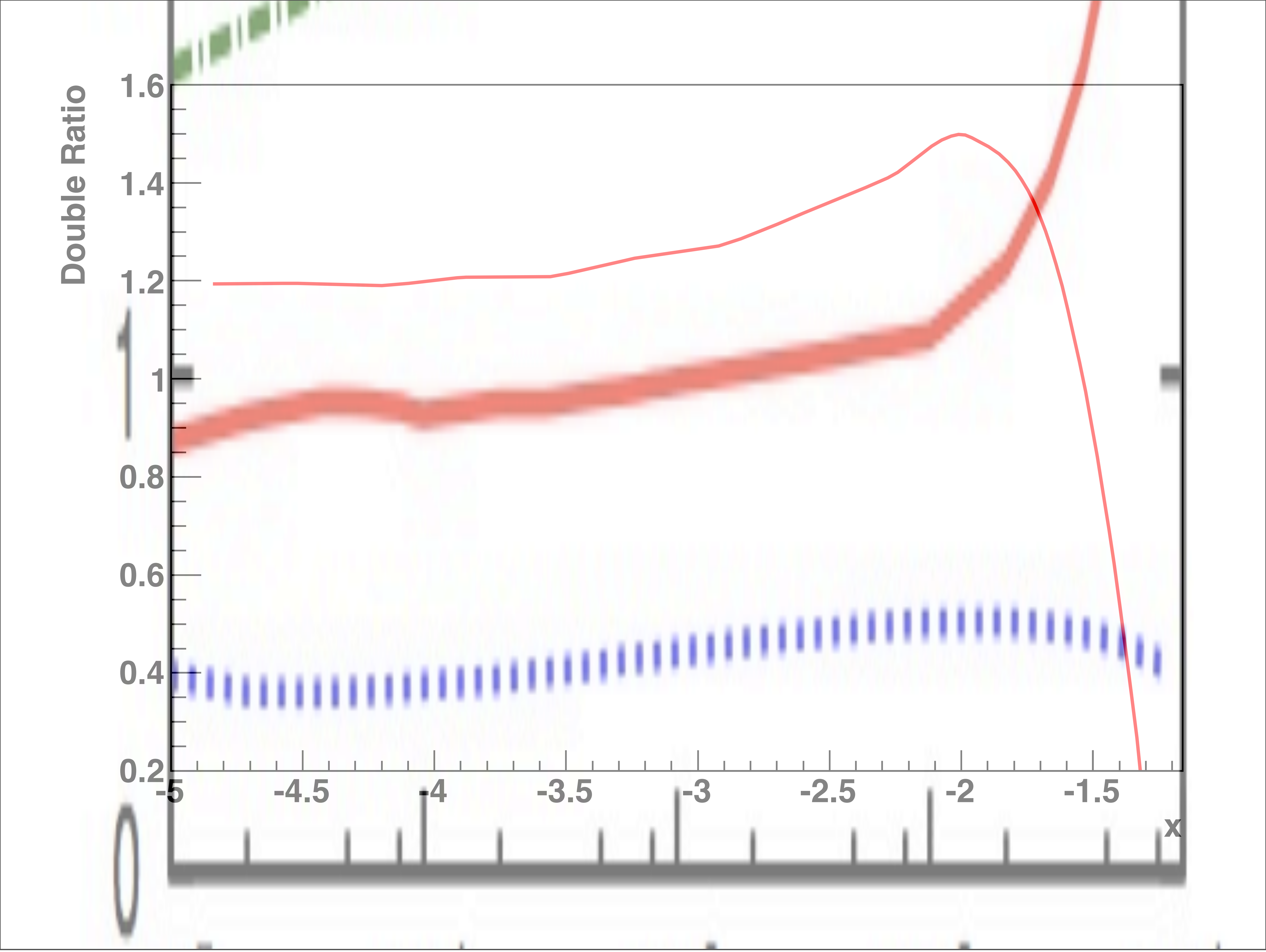






LT (high)
LT (low)
LT (eikonal)
Q^2=4 GeV^2
R
Double Ratio
x


Double Ratio
$x = 10^{-3},\ M_X^2 = 5\ \mathrm{GeV}^2$
LT (high)
LT (low)
$\log_{10}(Q^2/\mathrm{GeV}^2)$


Double Ratio
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
-5
-4.5
-4
-3.5
-3
-2.5
-2
-1.5
x

$\sim A^{0.42}$

$$Q_{s,A}^2 = \left(\frac{A\pi R_p^2}{\pi R_A^2}\right)^{1/\delta} \times Q_s^2(x) \quad \delta = 0.79,\ \pi R_p^2 = 1.55\ \mathrm{fm}^2$$